Before the FEDERAL COMMUNICATIONS COMMISSION Washington, D.C. 20554

In the matter of:)	
)	
Technical Advisory Committee (TAC)	j	ET Docket No. 13-101
White Paper and Recommendations)	
for Improving Receiver Performance	j	

To the Commission:

COMMENTS OF JAMES EDWIN WHEDBEE

COMES NOW the undersigned, JAMES EDWIN WHEDBEE, who pursuant to Sections 1.415 and 1.419 of the Commission's rules and regulations (47 C.F.R. §§ 1.415, 1.419) and the Commission's invitation in the above-captioned proceedings, offers his following comments. Where appropriate to so infer from the comments which follow, pursuant to Section 1.41 of the Commission's rules and regulations (47 C.F.R. § 1.41), the undersigned informally requests any Commission actions subsequent to these proceedings be, at least in part, governed by those of these comments from which broader consensus develops.

I. Introduction – Standing

1. The undersigned is a citizen of the United States of America, initially licensed by the Commission on October 23, 1981 in the amateur radio service. Since then, the undersigned has been licensed as a commercial radio operator and has several radio station licenses in various radio services regulated by the Commission. In addition to civilian experience, the undersigned served on active duty with the U.S. Army as a node center operator during the first Persian

Gulf War, and therefore is interested in these proceedings inasmuch as these proceedings may have an impact on governmental communications.

Accordingly, the undersigned is an interested party in these proceedings.

II. Responses to Specific Questions of the Commission – Interference Limits Policy Approach

2. In its April 22, 2013 Public Notice (DA 13-801) ("Notice" hereinafter), the Commission puts the following questions to the public for response. After each question, my comments responding thereto are given.

"What are the costs and benefits associated with this approach?" ANSWER: I agree with the Commission's assertion of a benefit in that improving receiver performance will eliminate some illegitimate interference claims requiring Commission resolution. However, I also believe there will be a corresponding increase in the monetary costs of receivers in various services if manufacturers are compelled to improve performance margins, if the antenna design isn't incorporated into receiver upgrades.

I disagree with the Commission that this regulatory approach will resolve improvident spectrum allocations or resolve interference disputes by a primary radio service against a poorly-allocated secondary/permitted radio service because the primary service has a right under statute and international law to protection against interference from a secondary/permitted service. The

degree of that interference is irrelevant to the primary service user because, from their point of view, the required enforcement action is elimination of the source of interference. Accordingly, and for the further reasons given hereinafter, this regulatory approach is not the panacea for resolving interference claims suggested in some portions of the TAC White Paper.

"Are there specific frequency bands or services that would particularly benefit from this approach or where implementation is straightforward and would be appropriate for a trial?" ANSWER: Qualified yes... The specific radio services which would benefit from this approach are competing commercial users of the radio spectrum. For non-commercial radio services using the spectrum or spectrum shared between commercial and non-commercial radio services, I believe the approach would actually be detrimental.

"Would proactive attention to establishing interference limits create more certainty in the marketplace for spectrum (re)allocations?" ANSWER: Maybe. The TAC White Paper suggests that harm claim thresholds somehow resolve interference claims, ab initio, and allow for greater innovation. Enforceable technical solutions, within redefinitions are necessary.

Redefining what constitutes harmful interference may resolve a semantic conflict, but does nothing to change realities on the ground. In point of fact, if

existing interference complaints aren't resolved and then the subject spectrum is packed with even more competing users, the Commission is effectively diminishing the value of that spectrum and decreasing the likelihood of innovation. Redefining interference, even with a corresponding improvement in receiver performance, is a dubious approach to regulating unless the goal is to abrogate regulating altogether, leaving the competing parties to hash out their differences.

The history of the Citizens' Band Radio Service is evidence favoring this assertion: when the Commission effectively stopped enforcing its own regulations in that service, the 26.96-27.41 MHz band became an electromagnetic anarchist's dream. Exclusivity is what increases value in a given portion of the electromagnetic spectrum. If the Commission desires to create innovation, exclusivity must be ensured, so the value of the spectrum being used is maintained. Improving receiver performance can aid in this; however, the Commission must consider differing modulated emissions to increase the number of radio services/users within a given allocated part of the RF spectrum.

For example, the Commission might consider 1K12F1E emissions in conjunction with 11K2F3E. The digital signals of the first emission transmit voice but are so narrow in bandwidth that the receiver's discriminator in the 11K2F3E system will reject the 1K12F1E transmitter while receiving the 11K2F3E system's wider analog

signal. The digital receiver of the 1K12F1E system will reject the 11K2F3E system's transmissions because those are analog. In short, these two systems could conceivably share spectrum and still be considered 'exclusive' because they aren't going to interfere. Likewise, requiring the use of certain antenna directionalities/polarizations can reduce the likelihood two competing uses of spectrum will interfere. However, if the point of the TAC White Paper is to cram as many users within a given block of spectrum as could conceivably fit, the Commission is in store for more problems rather than less.

"The TAC white paper makes note that an interference limits policy approach may not be appropriate in all cases. Are there other policy approaches that should be considered?" ANSWER: Yes. There are radio services associated with protecting the safety, health, and lives of the public which cannot tolerate market-based regulation of interference, but instead demand absolute priority of communications.

Particularly when those radio services are allocated a given spectral segment on a primary basis, the degree of protection from interference should be absolute. That is, the amount of interference that such a radio service should tolerate is zero. Even such radio services, when allocated on a secondary basis, should expect zero interference from Part 15 devices or radio services using their spectrum on a permissive (footnote) basis. Allocations made on a primary basis

to a non-commercial radio service should not be interfered with by secondary commercial radio services as this would defeat the entire point of primary and secondary allocations. These radio services should reasonably expect the Commission to stand between them and potential sources of interference.

This is not to suggest that primary, secondary, and permitted users sharing spectrum resources don't have some duty to one another to get along. So many radio services share spectrum well already. It's self-evident there are advantages to negotiated solutions to interference problems; accordingly, the Commission would be well-advised to act as enforcer when negotiations break down or interference would result in degradation of radio services associated with the protection of safety, health, and lives, along the lines of which service is primary, secondary, and permitted.

"Are the incentives in the TAC white paper recommendations for improving receiver robustness to interference sufficient?" ANSWER: No. Just as with spectrum auctions, the fastest way for the industry to show the Commission the insufficiency of its incentives would be to do nothing.

If nobody will bid for certain licenses at auction, the value of those licenses is zero. In fact, given the cost of putting together the auction, it would have been more cost-effective had the Commission given away the licenses for which

nobody would bid. If nobody will voluntarily improve receiver performance, the value of the regulatory approach is, at most, zero. I would argue that the value of the regulatory approach is effectively negative when industry chooses to ignore 'incentives,' because in adopting the approach, the Commission is prepared to abrogate part of its regulatory role as it did in the case of the Citizens' Band Radio Service. While the electromagnetic spectrum may be a natural resource, it may not readily yield to economic solutions to regulation; accordingly, just as exclusively putting high-power mobile digital FM voice communications services in the 26.96-27.41 MHz band would resolve the CB Radio Service problem (because the new digital service could easily tolerate the analog interference of CB transmitters and, upon transmission, would overwhelm the receiver circuitry of the CB receiver with an incomprehensible digital emission), the Commission is still going to need to consider exclusivity of allocations as the means to creating value in the spectrum. This is still a command-and-control approach to an economic problem (no value in certain spectrum), but it's the correct approach in some cases.

"Are there other incentives not mentioned in the TAC white paper recommendations that should be considered?" ANSWER: Yes, there are at least two: antenna design and exclusivity. By way of introduction only, antenna design is the lowest cost/highest reward option. If the Commission requires (by rulemaking) nominal improvements in receiver design and allows those

improvements to be met by one or more of the antenna design characteristics which follow, the objectives of the TAC White Paper will be more efficaciously met with greater speed.

First and foremost, by requiring antenna directionality, it is likely the Commission will achieve greater efficiency in the utilization of spectrum while improving receiver operation. Directional antennas can be designed for point-to-point communications, field-of-fire coverage (multiple users within a given antenna beam-width are covered), and point-to-multipoint coverage. Likewise, requiring a particular antenna polarization can increase coverage too while decreasing potential interference from other users with different polarizations. Antennas can allow multiple users to operate within the same spectrum – same frequency, in fact – by using one or more of these techniques. Given the potential combinations of antenna directionalities and polarizations, receiver performance can be greatly enhanced with just better antenna design and use.

Signal-to-noise rations being an important consideration, if the Commission guarantees exclusivity within given segments of the RF spectrum, manufacturers may see value in improving receiver performance for that spectrum; however, the same receiver would effectively be improved on adjacent spectrum. Broadband over Power Lines (Access BPL) is a prime example of a commercial

failure because exclusivity could not be assured. The entire segment within a given allocation need not be exclusive, but if a pocket within that segment is, the incentive exists to improve performance. As a negative proof of concept: Access BPL was/is essentially a repackaged version of carrier current systems already authorized under Part 15...the difference between them being digital emissions with BPL versus analog emissions for carrier current. Access BPL, through the Commission, wound up making an empty promise to industry and consumers alike when it was discovered that licensees were willing to fight to keep a Part 15 user from interfering with licensed spectrum. Had Access BPL notched spectral segments in exchange for promises of exclusivity in other spectral segments, we could have successfully rolled Access BPL out as an alternative/competing broadband service, but the Commission overlooked the paramount value of exclusivity. In attempting to move away from a commandand-control approach to regulating spectrum to a spectrum-as-property approach, the Commission shouldn't overlook the obvious and apparent analogy in real estate that exclusivity results in higher value.

"Should the Commission consider circumstances unique to each service, such as the diversity of devices available, the cost of replacement devices, typical replacement times, or sophistication of users that may impact the practicality, necessity, or sufficiency of such an approach?" ANSWER: Yes. To ignore such circumstances would be capricious and heavy-handed.

"How should the technological evolution of components and receiver design influence the timeframe and evolution of interference limits? In light of these issues, are there other alternatives, or other options within an interference limits policy approach, that should be considered for further analysis and/or smallscale pilot tests? What are the cost and benefit tradeoffs of these alternatives?" ANSWER: Gradual improvements in the state-of-the-art will provide for the opportunity for an evolution of interference limits. Many radio services, including experimental and amateur, provide ample opportunities for small-scale pilot tests as well as for the improvement in the state-of-the-art. An easy example of this is the 1K12F1E digital voice emissions I discussed above. The Commission's recent narrow-banding of mobile services reduced bandwidths to 11.2 kHz for analog FM voice emissions, but an amateur radio invention allows ten 1.12 kHz digital voice channels to be crammed into the one analog channel created with the Commission's narrow-banding regulation without degradation of quality while improving propagation characteristics (narrow-banded signals having a higher spectral density within a given bandwidth will propagate further, particularly with a well-designed antenna.)

III. Responses to Questions of the Commission – Receiver Standards

3. These responses will not address each question; however, in general, to all of the Commission's questions regarding receiver standards, I have the following comments...

Concentrate on requiring improvements in antennas being used. For broadband design, the least costly approach with the greatest advantages overall is antenna design. Receivers using high gain antennas are more sensitive, even though the receiver circuitry itself hasn't changed. Receivers using directional antennas can 'weed out' unwanted signals. Receivers using common antenna polarizations can effectuate an inherent 3 dB rejection of unwanted signals. The TAC White Paper concentrates on unwanted signal rejection in the receiver circuitry, but there is no reason within the TAC White Paper or the Commission's subsequent Public Notice to avoid consideration of the antennas connected to those receivers insofar as the desired outcome is the same. Moreover, there is no reason that antenna design could not be part of any industry standard: there is an obvious cost advantage in doing so.

In adopting harm claim thresholds, equipment meeting certain standards (whether market-based or imposed by regulation) ought to get the benefit of the doubt from the Commission in cases of interference claims. Equipment not meeting those standards ought to be required to carry the burden of proof in cases of interference claims. What the Commission, in essence, is requesting

here is what burdens of proof are carried? For equipment which meets standards, the burden of proof of interference should be a preponderance of the evidence in degree. For equipment which doesn't meet standards, the burden of proof of interference should be clear and convincing in degree.

As for repositories of information and so forth, I have no comment. There ought to be a requirement for receiver performance disclosure to consumers, but how well consumers are informed about their equipment is another matter. My own narrowband receivers must attain a 10 dB signal-to-noise ratio at -119dBm received signal strength before I consider those acceptable. I have over three decades experience in telecommunications, though; the typical consumer does not. Without informed consumers, what's industry's incentive to change? I see none. Industry will likely consider any required changes, other than consumer-driven changes, to be a regulatory burden.

With this in mind, the Commission is facing a decision. If the Commission imposes change, can it do so without increased costs? The answer is no, unless antenna design is incorporated within its requirements. This gives industry developers incentives to create increasingly better receivers, but without corresponding antenna improvements, the need for better receivers is rather moot because cramming more users within a given part of the spectrum will simply offset the

amount of receiver improvement with correspondingly higher levels of interference.

IV. Responses to Specific Questions of the Commission – Multi-Stakeholder Organizations

4. In its April 22, 2013 Public Notice (DA 13-801) ("Notice" hereinafter), the Commission puts the following questions to the public for response. After each question, my comments responding thereto are given.

"What frequency bands would be most appropriate for considering the formation of a multi-stakeholder organization ("MSO") to develop technical parameters and methods for implementing an interference limits policy?" ANSWER: I think the notion of a multi-stakeholder organization developing technical parameters and methods for implementing interference limits is great in principle. That said, it'd be wise to initiate this around a non-controversial test case, such as mentioned above: dealing with the age-old Citizens' Band Radio Service problem. Here is a scenario where there's so very little to lose and a great deal to gain. Forming the MSO might include members of the over-the-road trucking industry, various REACT groups, adjacent band users (broadcast, government, etc.), and finally, prospective entrants into the band (digital communications companies, for example). The aim here isn't to eliminate CB, but to put that band to other uses as well. In the preceding paragraphs it was suggested 1K12F1E emissions at higher powers (~100 Watts ERP, for example)

would be generally immune from interference from CB, but the MSO itself would determine the actual emission, the power levels, and the new uses to which the band might also be put. The follow-through to this MSO's decision would be Commission implementation through rulemaking and MSO monitoring.

Depending on how this non-controversial test case goes, the process might be opened to the following bands: 0-500 kHz*, 82-88 MHz, 156-162 MHz, 216-222 MHz, 450-512 MHz, 902-928 MHz, 2.4-2.45 GHz, 3.5-3.75 GHz. I would have included the entire UHF TV broadcast band, but I believe the White Space regulations just implemented by OET deserve time to mature before compounding this period of transition with something else new. (*NOTE: The 0-500 kHz band is perhaps the worst utilized band in the "old" spectrum, but possesses the greatest potential for reliable long-range communications independent of satellites, if properly regulated. For example, the static and other interference sources often cited as reasons for this under-utilization would largely not trouble users of 1K12F1E digital voice both because the emission mode is FM and because it is digital. That said, the potential of this spectrum is unrealized because of entrenched interests such as electric utilities. The notion of MSOs establishing criteria for new entrants opens this band to many new possibilities.)

"Are there more effective methods of organizing a diverse group of stakeholders for developing such technical parameters?" ANSWER: Yes. MSOs need to be comprised of more than business interests and their representatives in law and politics. Ordinary citizens, including those with no licensed interests in the outcome, ought to be part of MSOs because it is the public resource of the spectrum being used. This gives greater balance to any outcome, greater

legitimacy to any outcome, and establishes democratic principles as the underlying basis for the decisions of any MSO.

"What is the best way to initiate the formation of a multi-stakeholder group?" ANSWER: Ask. Issue a public notice asking for participation, but make sure that the public notice is genuinely public. The average citizen doesn't read the Federal Register. Finally, establish participation criteria to ensure balance, fairness, and democratic principles. First and foremost, average citizen participation is a must. Those of us with licenses have our favorite and least favorite outcomes generally predetermined, so having ordinary people within the MSO creates a pool of disinterested parties whose insights may not just give the benefits aforementioned in the preceding paragraph, but even give insights into where untapped demand exists for services. Second, depending on the frequency band for which the MSO is being created, authorized users should be represented. If authorized users are represented, that would be governmental and non-governmental, so this resolves one of the Commission's concerns. Finally, any MSO would be incomplete without the technical expertise RF engineering expertise possess. These experts would inform and guide decisions to reach the outcomes the TAC White Paper observes as its goal. Aside from these "big picture" criteria, the MSO should adopt its own rules and have the creative license to be unique for the given band it is assigned.

"How should the FCC and NTIA coordinate with government agencies and other stakeholders to address situations where large numbers of users are impacted by changes to adjacent spectrum licenses?" ANSWER: See my response above.

"Should the FCC and NTIA perform band assessments to determine where possible future repurposing in a band might impact adjacent bands and develop plans and processes to ensure proper protections? ANSWER: Yes.

V. Responses to Specific Questions of the Commission – Role of the F.C.C.

5. In its April 22, 2013 Public Notice (DA 13-801) ("Notice" hereinafter), the Commission puts the following questions to the public for response. After each question, my comments responding thereto are given.

"We seek general comment on whether and how the Commission should implement a policy that incentivizes improved interference tolerance of wireless systems. Specifically, should the FCC adopt a policy of employing interference limits in certain cases of neighboring bands and services?" ANSWER: Yes, provided that the limits are predicated in science and fact rather than political arm-twisting and suppositions where no prior history exists.

"Should the FCC adopt specific rules for establishing interference limits that are recommended by one or more multi-stakeholder groups?" ANSWER: Yes. Why else bother doing all this?

"Should the FCC develop a compliance model similar to the one used in the context of CALEA, in which there is industry-led establishment of standards and solutions and the Commission would get involved only via special petition?" ANSWER: No. This would be abrogating a duty: be prepared to enforce MSO decisions, including interlocutory decisions; the Commission is tasked with ultimately preventing interference. Requiring what amounts to a Petition for Extraordinary Relief in the form of a Writ of Mandamus is too extreme and, oftentimes, too late. Moreover, the CALEA predicate isn't even analogous to these proceedings (after all, where's the nexus?).

"We envision that the FCC could be a facilitator in a nondirective role with convening stakeholders. Also, the GAO recommends consideration of small-scale pilot tests of options for improving receiver performance. What should be the scope of an appropriate pilot test? ANSWER: Agreed on FCC's role as facilitator. Agreed on GAO's recommendation of a small-scale pilot test. There already exists a multi-decade problem within the 26.96-27.41 MHz band. There is very little to lose and a great deal to gain by making this the test case. Moreover, I suspect the retooling of this band which followed would impose a

bit of discipline upon existing users. It's a neglected region of the RF spectrum for a reason, little controversy would be raised in suggesting the problems in this band need to be eliminated, so there's tremendous opportunities in making it the test case, including but not limited to HF access to internet, texting, and email for which I am quite certain the telecommunications industry would take great interest in demonstrating.

"What role should the FCC play in encouraging and initiating industry action? Are there existing FCC proceedings where incentives to improve the interference tolerance of wireless systems should be applied?" ANSWER: As stated above, start with a Notice of Inquiry for interested party participation. Create the MSO through this vehicle. WT Docket No. 10-119 is still open and, again, could provide a regulatory vehicle through which an initial test case, for proof of concept, could be made.

VI. General Comments

6. Within the framework of my responses above, I would encourage the NTIA, the Commission, and the GAO to treat commercial and non-commercial users of the RF spectrum as equal. Any perception of favoritism on the part of government in the creation of these MSOs will immediately erode confidence and credibility. Aside from this cautionary note, provided MSO decisions are well-grounded in science, historical fact, and the needs of RF users, there seems to be much to like about the Commission's ideas as discussed in the TAC White

Paper and I'll be looking forward with great anticipation to what is eventually decided.

Respectfully Submitted:

James Edwin Whedbee, M.P.A., M.Ed.

5816 NE Buttonwood Tree Lane Gladstone, Missouri 64119-2236

jamesewhedbee@yahoo.com